UNITED STATES PATENT AND TRADEMARK OFFICE

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SHARMINI N. GREEN
C/O BLAKELY, SOKOLOFF, TAYLOR & ZAFMAN LLP
12400 WILSHIRE BOULEVARD
SEVENTH FLOOR
LOS ANGELES, CA   90025

EXAMINER
TRUONG, LECHI

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Please find below and/or attached an Office communication concerning this application or proceeding.

PTO-90C (Rev. 10/03)

-- *The MAILING DATE of this communication appears on the cover sheet with the correspondence address* --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE _3_ MONTH(S) FROM
THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed
  after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
  Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any
  earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) ☒ Responsive to communication(s) filed on _14 July 2005_.
2a) ☐ This action is FINAL.   2b) ☒ This action is non-final.
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is
   closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4) ☒ Claim(s) _1-16_ is/are pending in the application.
   4a) Of the above claim(s) _____ is/are withdrawn from consideration.
5) ☐ Claim(s) _____ is/are allowed.
6) ☒ Claim(s) _1-16_ is/are rejected.
7) ☐ Claim(s) _____ is/are objected to.
8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9) ☐ The specification is objected to by the Examiner.
10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
    a) ☐ All   b) ☐ Some * c) ☐ None of:
    1. ☐ Certified copies of the priority documents have been received.
    2. ☐ Certified copies of the priority documents have been received in Application No. _____.
    3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage
       application from the International Bureau (PCT Rule 17.2(a)).
    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
   Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413)
   Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1.   Claims 1-16 are presented for the examination.

Claim Rejections - 35 USC § 112

2.   Claims 1-16 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for

failing to particularly point out and distinctly claim the subject matter which applicant regards as

the invention.

A. The following claim language is not clearly defined.

(i) As to claim 1, 8, 10, 12, 15, it is not clearly indicated how the second pointer can

allow to cast the reference of an interface type into the references whose type is defied by the

class configured to implement the interface.

Claim Rejections - 35 USC § 101

35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or
any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and
requirements of this title.

3.   Claims 1-9, 12-14 are rejected under 35 U.S.C. 101 because they are directed to non-

statutory subject matter.

4.   Claims 1-7 are non-statutory because it is not tangibly embodied in a manner so as to be

executable as the only hardware is in an intended use statement.

Claims 1 defines " System" in the preamble and the body of the claim recites " an

interface", " a class", an interface vtable", " an object". An interface, a class, an interface vtable,

an object appear to be software modules, which are not tangible. Therefore, claim 1 is non-

statutory because it recites a system claim that comprises non-tangible embodiments.

5.   Claims 8, 12 are directed to method steps, which can be practiced mentally in

conjunction with pen and paper, therefore they are directed to non-statutory subject

matter. Specifically, as claimed, it is uncertain what performs each of the claimed

method steps. Moreover, each of the claimed steps, receiving, invoking can be practiced

mentally in conjunctions with pen and paper. The claimed steps do not define a machine or

computer implemented process (see MPEP 21061. Therefore, the claimed invention is directed to

non-statutory subject matter. (The examiner suggests applicant to change "method" to "computer

implemented method" in the preamble to overcome the outstanding 35 U.S.C. 101 rejection).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in
> section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are
> such that the subject matter as a whole would have been obvious at the time the invention was made to a person
> having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the
> manner in which the invention was made.

6.   Claims **1, 8, 10** are rejected under 35 U.S.C. 103(a) as being unpatentable over Jones et al

(US. Patent 5,754,862) in view of Jordan (US. Patent 6,016,392) in view of Law(US. Patent

5,794,041).

7.   **As to claim 1,** Jones teaches the invention substantially as claimed including: a class (the

class, col 5, ln 15-53/col 7, ln 1-25/col 12, ln 35-67), implement (implement, col 5, ln 44-67), a

function (the function members 603,604,605,607, col 12, ln 35-67/ Fig. 6), an vtable (virtual

function table, col 5, ln 15-53/col 7, ln 1-25/col 12, ln 35-67/ Fig. 6), a first pointer (B1:fal1 603,

col 12, ln 35-67/ Fig. 6), an object (the data structure 601, col 5, ln 15-53/col 7, ln 1-25/col 12, ln

35-67/ Fig. 6), an instance of the class(instance of class, col 5, ln 43-59), second pointer(vfptr

pointer, col 7, ln 1-4/A1::vfptr, col 11, ln 50-67/ col 12, ln 35-67, Fig. 6).

8.   Jones does not explicit teach the term the second pointer of an object configured to point

to the interface vtable associated with the interface, the second pointer allowing for efficiency

casting of references of an interface type into references whose type is defined by the class

configured to implement the interface. However, Law teaches the second pointer of an object

configured to point to the interface vtable associated with the interface (virtual dispatch is

efficiency implemented as an indirect function call through a table of function address, called a

virtual function table or VFT... then any object of that class has a pointer to one of the class's

VFTs and this pointer provides the mechanism for accessing the VFT. This pointer referred to as

the VFT pointer, col 4, ln 49-6), the second pointer allowing for efficiency casting of references

of an interface type into references whose type is defined by the class configured to implement

the interface(Adjust the this pointer to the subobject X in the D object whose VFT contains the

entry that has the address of E::f( ) , col 5, ln 1-5/ static typ S is pointed to by p in a virtual

function call p->f( ) and the actual function invoked I f defined in class E denoted by E:: f( ) an

early cast in an adjustment of a this pointer to a subobject X in the D object whose VFT contains

the entry that has an address of E::f ().

9.   It would have been obvious to one of the ordinary skill in the art at the time the invention was made to combine the teaching of Jones and Law because Law's the second pointer of an object configured to point to the interface vtable associated with the interface, the second pointer allowing for efficiency casting of references would improve the efficiency of Jones's system by allowing a way to share a virtual function table pointer and virtual base pointer with a direct virtual base.

10.   **As to claim 8**, it is and apparatus claim of claim 1; therefore, it is rejected for the same reason as claim 1 above. In additional, Law teaches invoke a function (col 4, ln 60-65).

13.   **As to claim 10,** it is apparatus claim of claim 8; therefore, it is rejected for the same reason as claim 8 above.

14.   Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Jones et al (US. Patent 5,754,862) in view of Law(US. Patent 5,794,041), as applied to claim 1 above, and further in view of in view of Jordan (US. Patent 6,016,392).

15.   **As to claim 7,** Jones and Law do not teach interface vtable is indexed by the name of the function. However, Jordan teaches interface vtable is indexed by the name of the function (an pairing interface ID with the Vtable 416, col 3, ln 33-67/ Fig. 4).

16.   It would have been obvious to one of the ordinary skill in the art at the time the invention was made to combine the teaching of Jones, Law and Jordan because Jordan's interface vtable is indexed by the name of the function would improve the use of Jones and Law's systems by

allowing an interface list with information about which interfaces are supported on each class

and relieve individual designers to device complicated schemes to reduce memory consumption.

17.   Claims 2, 3, 4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jones et al

(US. Patent 5,754,862) in view of Law(US. Patent 5,794,041), as applied to claim 1 above , and

further in view of AP (Arrays, pointers, pointer arithmetic).

18.   **As to claim 2,** Jones, Law do not teach a third pointer points to a canonical base address.

However, AP teaches a third pointer points to a canonical base address (the new pointer point to

X [1], sec 7.3, page 1-3).

14.   It would have been obvious to one of the ordinary skill in the art at the time the invention

was made to combine the teaching of Jones, Law and AP because AP's the new pointer point to

X [1] would improve the flexibility of Jones and Law's systems by allocating the specified

number of contiguous cells of the indicated type.

19.   **As to claim 3,** AP teaches the pointer is located at a predefined offset from the second

pointer, and adjacent to the second pointer (the new pointer equals the original value of the

pointer by increased by the size of type involved (sec: 7.3, page 1).

20.   **As to claim 4,** AP teaches the third pointer is adjacent to the second pointer (the third

pointer is adjacent to the second pointer teaches X+0, X+1 pointer, sec 7.3, page 1-3).

21.   Claims 5,6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jones et al

(US. Patent 5,754,862) in view of Law(US. Patent 5,794,041), as applied to claim 1 above, and

further in view of Kathleen Fisher et al (What is an Object – Oriented Programming Language?)

22.   **As to claim 5,** Jones, Law do not explicit teach the term a class vtable, fourth pointer

(&(B3:Fal1. Fig. 14). However, Kathleen teaches a class vtable, fourth pointer (class's Vtable,

the A vtable contains pointers to the methods, sec: 2.3, page 7/ Fig. 1/Fig. 2).

23.   It would have been obvious to one of the ordinary skill in the art at the time the invention

was made to combine the teaching of Jones, Law and Kathleen because Kathleen's class's

Vtable, the A vtable contains pointers to the methods would improve the efficiency of Jones and

Law' systems by reducing the cost of method lookup to a simple indirection without searching

by an ordinary function call.

24.   **As to claim 6,** Jones teaches vtable is indexed by the name of function (the virtual

function name af11, col 14, ln 1-55, Fig. 10).

25.   Claims 9, 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jones et al

(US. Patent 5,754,862) in view of Law (US. Patent 5,794,041), as applied to claim 1 above, and

further in view of Danel Liang (Java programming).

26.   **As to claim 9,** Jones, Law do not explicit teach an argument. However, Liang teaches an

argument (an argument page 118, sec: passing objects to methods).

27.   It would have been obvious to one of the ordinary skill in the art at the time the invention

was made to combine the teaching of Jones, Law and Liang because Liang's an argument would

improve the efficiency of Jones and Law's systems by providing great flexible, modularity and

reusability for developing software.

28.   **As to claim 11**, it is an apparatus claim of claim 9; therefore, it is rejected for the same

reason as claim 9 above.

29.   Claims 12, 15, 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over TO

(Object Reference casting) in view of Law(US. Patent 5,794,041).

30.   As to claim 12, TO teach a first reference (reference, page 2, ln 26-50), an object (object,

page 2, ln 26-50), a type (M1, page 2, ln 26-50), an interface (an interface, ln 26-50), a request to

cast (cast, page 2, ln 26-50), a type defined by a class (class type, page 2, ln 26-50).

31.   TO do not teach a pointer contained in the object, the pointer configured to point to a

canonical base address of object, the pointer allowing for efficient casting of the first reference.

However, Law teaches a pointer contained in the object, the pointer configured to point to a

canonical base address of object (virtual dispatch is efficiency implemented as an indirect

function call through a table of function address, called a virtual function table or VFT... then

any object of that class has a pointer to one of the class's VFTs and this pointer provides the

mechanism for accessing the VFT. This pointer referred to as the VFT pointer, col 4, ln 49-6),

the pointer allowing for efficient casting of the first reference (Adjust the this pointer to the

subobject X in the D object whose VFT contains the entry that has the address of E::f( ) , col 5,

ln 1-5/ static typ S is pointed to by p in a virtual function call p->f( ) and the actual function

invoked I f defined in class E denoted by E:: f( ) an early cast in an adjustment of a this pointer to

a subobject X in the D object whose VFT contains the entry that has an address of E::f ( )).

32.   It would have been obvious to one of the ordinary skill in the art at the time the invention

was made to combine the teaching of TO and Law because Law's a pointer contained in the

object, the pointer configured to point to a canonical base address of object would improve the

efficiency of TO's system by allowing a way to share a virtual function table pointer and virtual

base pointer with a direct virtual base.

33.   As to claims 15, 16, they are apparatus claims of claims 12, 13; therefore, they are

rejected for the same reasons as claims 12, 13 above.

34.   Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over TO (Object

Reference casting) in view of Law(US. Patent 5,794,041), as claimed in claim 1 above, in view

in view of AP (Arrays, pointers, pointer arithmetic).

35.   As to claim 13, TO and Law do not teach the pointer is located at a predefined offset

from the second pointer, and adjacent to the second pointer. However, AP teaches the pointer is

located at a predefined offset from the second pointer, and adjacent to the second pointer (the

new pointer equals to X [1], sec 7.3, page 1-3).

36.   It would have been obvious to one of the ordinary skill in the art at the time the invention

was made to combine the teaching of TO, Law and AP because AP's the pointer is located at a

predefined offset from the second pointer, and adjacent to the second pointer by would improve

the use of TO and Law's systems by providing handle type safe casting between polymorphic

classes of an object via pointers or references.

37.   Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over TO (Object

Reference casting) in view of Law(US. Patent 5,794,041), as applied to claim 12 above, and

further in view of Gartner et al (US. Patent 6,421,681 B1).

38.   **As to claim 14**, TO, Law do explicit not teach return the type defined by casting.

However, Gartner teaches return the type defined by casting (return ... cast to object, col 18,l n

1-20).

39.   It would have been obvious to one of the ordinary skill in the art at the time the invention

was made to combine the teaching of apply the teaching of TO, Law and Gartner because

Gartner's return ... cast to object would improve the efficiency of TO, Law's systems by making

method for dispatch of interface calls more consistent.

Conclusion

Any inquiry concerning this communication or earlier communications from the

examiner should be directed to LeChi Truong whose telephone number is (703) 305 5312. The

examiner can normally be reached on 8 - 5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's

supervisor, Meng-Ai An can be reached on 703-305-9678. The fax phone number for the

organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent

Application Information Retrieval (PAIR) system. Status information for published applications

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system, contact the Electronic Business Center (EBC) at 866-217-9197(toll-free).

LeChi Truong

September 22, 2005

MENG-AI T. AN
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